The Effect of Diet Composition, and Pre-Slaughter Feeding Level on Visceral Organ Weight in Finishing Pigs

Erin McNeilage-VanDeWiele, Ridgetown College

Dr. Kees de Lange, University of Guelph

Prepared for: Centralia Swine Research Update, Feb. 2, 2000

Introduction:

Visceral organs, including the stomach, small and large intestine, rectum and colon, pancreas and liver, comprise approximately 15 - 20 % of total body weight in finishing swine, and are responsible for approximately 50% of whole body energy expenditure (Gill et al., 1989; Yen et al., 1989; Huntington, 1990). Several dietary factors are thought to increase visceral organ weights, including fibre and feeding level (Yen et al., 1989; Kelly et al.,1993; Finegan, 1996). The major consequence of these increased visceral organ weights is reduced financial returns to pork producers, due to a decrease in carcass dressing percentage, and poorer feed efficiency due to increased energy expenditure. Previous studies have suggested that the weight of visceral organs may be reduced by reducing feeding levels or feeding a highly digestible diet immediately prior to slaughter.

Objectives:

1. *To determine effects of pre-slaughter feeding level and/or diet composition on weights of selected visceral organs (stomach, small intestine, cecum, rectum and colon, heart, lungs, liver, spleen and pancreas) in market pigs.*

Methodology:

The study was conducted at the University of Guelph, Ponsonby Research Station, using 96 Yorkshire pigs (48 gilts, 48 barrows). The study was divided into two growth periods. During period one (approximately 48 - 95 kg BW), pigs were fed either a barley-canola meal-based diet (BCM) or a corn-soybean meal based diet (CSM) fed *ad libitum*. Once the average BW of pigs in a pen reached 95 kg, the pen was randomly allocated to a sub-treatment. From each of the BCM and CSM treatments, 16 pigs remained at the *ad libitum* intake level. A further 16 pigs from each treatment were restricted to 2 kg/pig/day, while a third group of 16 pigs from each treatment were *ad libitum* fed a highly digestible casein-cornstarch-based diet. As the average BW of pigs in a pen exceeded 105 kg, pigs were slaughtered. Once killed, the visceral organs were separated. Gutfill was removed and weighed, as were the empty visceral organs.

Results:

The organs weighed included the stomach, small intestine, cecum, rectum and

colon, liver, pancreas, heart, lungs and spleen (Tables 1 and 2). Additionally once gutfill was removed from the organs, it was weighed as well. 101-05310/

| Top of Page |

Table 1.

The Weight of Individual Visceral Organs and Gufill in Pigs Subjected to Various Feeding Regimens

Treatments' # Gutfill Stomach Small Cecum Rectum

pigs (g) (g) Intestine 2 (g) and

(g) Colon (g)

BCM - *ad libitum*15 4835a,3 629a 1348 200a 1700

1 b a,,

BCM - limit fed 16 338 586 1184 180a,, 1493

BCM - casein 16 2504"r- 558 ab 1271 43 1427

CSM - *ad libitum*16 3104 b 560ab ab

1393 168 1673

CSM - limit fed 16 290obc 563 ab 1215 167 ab 1360

CSM - casein 16 2303c 542" 1341 173a" 1430

'Treatments consisted of BCM = barley-canola meal-based diet; CSM - corn-soybean mealbased diet; ad *libitum* = unlimited intake; limit fed = 2 kg/pig/day; Casein = highly digestible semiS nthetic diet.

2SY mall intestine includes the combined weights of the duodenum, jejunum, and ileum.

3 Values within columns with differing superscripts (a,b,c) are different ($P < 0.05$).

Table 2.

The Weight of Individual Visceral Organs in Pigs Subjected to Various Feeding Regimens

Treatments' Liver Pancreas Heart (g) Lungs Spleen

pigs (g) (g) (g) (g)

BCM - *ad libitum* 15 1895a,2 207 377 ab 824 148

BCM - limit fed 16 1549c 168 393a 694 160

BCM - casein 16 1678" 179 387 736 156

CSM - *ad libitum* 16 1799a,, 181 372ab 791 159

CSM - limit fed 16 1456c 200 357a 708 154

CSM - casein 16 1613 bc 178 409b 819 165

'Treatments consisted of BCM = barley-canola meal-based diet; CSM - corn-soybean meal-

based diet; *ad libitum* = unlimited intake; limit fed = 2 kg/pig/day; Casein = highly digestible semi-

synthetic diet.

· Values within columns with differing superscripts (a,b,c) are different (P < 0.05). Summary and Conclusions-,

1. Feeding a highly digestible diet will reduce gutfill in pigs previously fed BCM or CSM

2. Restricted feeding will reduce gutfill in BCM-fed pigs, however, no changes in gutfill were observed in CSM-fed pigs.

3. Largest effects were seen in the ceum and liver, while no effects were seen in the small intestine, lungs or spleen. Highest visceral organ weights were observed in pigs fed ad libitum BCM while the lowest weights were observed in pigs fed casein or fed restricted CSM.

| Top of Page |

The authors sincerely appreciate the financial support provided by Ontario Pork, and the OMAFRA animal program at the University of Guelph.

References:

Finegan, E.J. 1996. The role of gut tissue in energy metabolism of growing lambs fed forage or concentrate diets. M.Sc. Thesis, University of Guelph, Guelph, Ontario, Canada.

Gill, M., J. France, M. Summers, B.W. McBride, and L.P. Milligan. 1989, Simulation of the energy costs associated with protein turnover and Na+, K+-transport in growing lambs. J. Nutr. 119:1287-1299.

Huntington, G.B. 1990. Energy metabolism in the digestive tract and liver of caftle: Influence of
physiological state and nutrition. Reprod. Nutr. Dev. 30:35-47.

Kelly, J.M., B.G. Southorn, C.E. Kelly, L.P. Milligan, and B.W. McBride. 1993.
Quantification of in vitro and in vivo energy metabolism of the gastrointestinal tract of fed or fasted sheep. Can. J. Anim. Sci.73:855-868.

Yen, J.T., J.A. Neinaber, D.A. Hill, and W.G. Pond. 1989. Oxygen consumption
by port vein-drained organs and by whole animal in conscious growing swine. Proc. Soc. Exp. Biol. Med. 190:393-398.

| Top of Page |

| Livestock Home Page |

| Central Site | Feedback | Search | Site Map | Français |
| Home | What's New | Calendar | Products | News Releases |

Ontario
This site maintained by the Government of Ontario, Canada

This information is provided as a public service, but we cannot guarantee that the information is current or accurate.
Readers should verify the information before acting on it.

Feedback and technical inquiries to: livestock@omafra.gov.on.ca
© Copyright 2001 Queen's Printer for Ontario
Last Updated: January 29, 2001